Sustainable Forest Management

2016 Facts & Statistics

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Aspen Defoliators

The forest tent caterpillar (*Malacosoma disstria*) (Figure 1), large aspen tortrix (*Choristoneura conflictana*) and Bruce spanworm (*Operophtera bruceata*) are the most common insect defoliators of trembling aspen trees in Alberta.

These insects cause the loss of aspen leaves (defoliation). Normally one of these insect species is the dominant defoliator at a given time and are eventually replaced by another.

Trees affected by these pests can be scattered over millions of hectares of aspen forest. These insects have temporary and sudden large-scale increases in populations, known as outbreaks or epidemics followed by low populations.

This cycle continues over time. Bruce spanworm outbreaks last for two to three years while large aspen tortrix outbreaks can last three to four years. Forest tent caterpillar outbreaks tend to last the longest at up to seven years.

Defoliators cause tree growth loss by severely reducing the host tree's ability to convert water, nutrients and carbon dioxide into sugars, starches and oxygen through photosynthesis.

The host trees react to severe defoliation by producing a second flush of buds, but the resulting leaves are smaller and do not adequately compensate for the loss of the first flush of leaves.

Aspen defoliators rarely kill host trees on their own. It does, however, leave the trees more prone to other pests, including insects, diseases and non-living agents, such as drought.

The widely dispersed aspen mortality in central Alberta can be partly attributed to repeated defoliation of drought-stressed trees.

Aspen defoliators, especially the forest tent caterpillar, can become nuisance pests invading residences and campsites.

They can also represent a traffic hazard by creating slippery road conditions when thousands of caterpillars (Figure 2) crossing highways are run over by vehicles.

Annual aerial overview surveys are conducted to record the gross area affected by aspen defoliation in the Green Area.

The objective of these surveys are to maintain an historical record of aspen defoliation over the Green Area. This data enables practitioners to follow the long-term trends of aspen defoliation in relation to changes in biological and environmental factors.

Figure 1. Forest tent caterpillar moth and eggmass

Figure 2. Forest tent caterpillar larvae on tree stem

Alberta Government

Statistics

Total aspen defoliation across the province amounted to 758,633 ha in 2016 (Table 1), a 46% decrease from the previous year. Defoliation was largely attributed to forest tent caterpillar (FTC), aspen twoleaf tier, and large aspen tortix.

FTC was the major pest defoliating approximately 525 thousand ha and was largely responsible for high levels of defoliation in the Lac La Biche Area (Table 2).

The FTC outbreak in the Peace River and High Level Forest Areas has collapsed though small pockets remain disturbed.

Defoliation by large aspen tortix increased from 54,444 ha to 213,316 ha in 2016.

Aspen twoleaf tier defoliation increased from 536 ha to 18,786 ha for the period 2015 to 2016.

Table 1. The extent of aspen defoliation, in hectares, of aspen defoliation in Alberta recorded during aerial surveys conducted in 2015 and 2016; categorized by pest.

Aspen Defoliation by Pest	Total area of scattered defoliation (ha)[1]	
	2015	2016
Aspen serpentine leafminer	0	536
Forest tent caterpillar	1,586,486	525,135
Bruce spanworm	3,564	0
Large aspen tortix	54,444	213,316
Bruce spanworm	3,564	0
Aspen twoleaf tier	536	18,786
Unknown aspen defoliator	0	859
Provincial Total*	**1,645,030**	**758,633**

* Total area defoliated by agent may include defoliation falling outside of the Green Area boundary. Total area surveyed will vary from year-to-year.

Table 2. Summary of aspen defoliation (in hectares) in 2016 by Alberta Forest Area.*

Forest Area	Total area defoliated (ha)*	
	2015	2016
Calgary	34,843	131,005
Edson	941	18,923
Fort McMurray	101,855	39,297
Grande Prairie	528,922	90,971
High Level	71,635	18,646
Lac La Biche	246,678	232,321
Peace River	135,566	20,028
Rocky Mountain House	9,095	75,717
Slave Lake	288,547	50,907
Whitecourt	189,383	80,818
Provincial Total	**1,607,465**	**758,633**

* Regional boundaries changed between 2014 and 2015 making direct comparison of defoliated areas by Forest Areas impossible.

Defoliation caused by forest tent caterpillar

Historical Trends

Between 2006 and 2016, FTC was the most abundant aspen defoliator observed during aerial overview surveys. While there have been four main defoliators recorded during the last 10 years, FTC was responsible for 72% of cumulative defoliation during this time period.

FTC populations reached outbreak proportions in 2006 (5,271,489 ha). Though the outbreak was distributed throughout the province, the majority of defoliation occurred in the High Level FA.

Populations reached outbreak status again in 2013 (10,021,918 ha).

As noted during the previous outbreak, FTC was distributed throughout much of the province but the greatest amount of disturbed area occurred in the Peace River, Slave Lake and Grande Prairie FAs.

Some regions of the province have experienced repeated years of defoliation by FTC and when combined with the effects of drought, aspen decline may be a concern.

The health of aspen stands will continue to be monitored during aerial overview surveys and observations made on the ground.

Figure 3.

Extent of aspen defoliation in Alberta in 2016 identified via aerial survey